This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A method for performing a fractional shift of transformed image data, comprising:

providing three fractional shift transform matrices $\tilde{A}$, $\tilde{B}$, and $\tilde{C}$ in non-volatile storage that [[is]] are capable of fractionally shifting image data by a shift factor;

receiving the transformed image data; and

applying the three fractional shift transform matrices $\tilde{A}$, $\tilde{B}$, and $\tilde{C}$ to vectors $\tilde{G}_1$, $\tilde{G}_2$,..., $\tilde{G}_m$ of the transformed image data to generate output transformed image data in an output device that is fractionally shifted by the shift factor without inverse transforming the transformed data, wherein the output transformed data is generated using two functions comprising:

$$\tilde{H}_k = \tilde{A} \bullet \tilde{G}_k + \tilde{B} \bullet \tilde{G}_{k+1} \quad \text{for } k = 1, 2, \ldots, m\text{-}1$$

$$\tilde{H}_k = \tilde{C} \bullet \tilde{G}_k \quad \text{for } k = m,$$

wherein the output transformed image data comprises an *mxm* matrix of the vectors $\tilde{H}_1$, $\tilde{H}_2$,...,$\tilde{H}_m$.

2. (Canceled)

3. (Currently Amended) The method of claim 1, wherein the transformed image data includes image data that has been downsampled.

4. (Original) The method of claim 1, wherein the shift factor is between zero and one.

5. (Original) The method of claim 1, wherein the non-volatile storage includes matrices having different shift factors to perform the fractional pel shift at different shift factors.

6. (Currently Amended) The method of claim 1, wherein the transformed image data is transformed by applying a Forward Discrete Cosine Transform (FDCT) to an input data stream.

7. (Original) The method of claim 6, wherein the input data stream was encoded performing entropy encoding after applying the FDCT and quantization.

8. (Currently Amended) The method of claim 7, further comprising:

entropy decoding the received encoded image data before applying the at least one fractional shift transform matrix; and

entropy encoding the output fractionally shifted transformed image data, wherein the transformed image data to which the three transformed matrices are applied comprises the entropy decoded encoded image data.

9. (Canceled)

10. (Currently Amended) The method of claim 8, wherein the fractional shift is collocated on a first data point in the encoded data to fractionally shift the image data.

11. (Previously Presented)The method of claim 1, wherein the transform matrices $\tilde{A}$, $\tilde{B}$, and $\tilde{C}$ are modified to accomplish dequantization and requantization of the vectors $\tilde{G}_1, \tilde{G}_2,...,$ $\tilde{G}_m$ and $\tilde{H}_1, \tilde{H}_2,....,\tilde{H}_m$, respectively.

12. (Original) The method of claim 1, wherein each fractional shift transform matrix is generated by applying a two-dimensional Forward Discrete Cosine Transform (FDCT) to a fractional shift matrix including the shift factors.

13. (Currently Amended) The method of claim 1, wherein the received and output encoded image data is encoded using one of the Joint Photographic Experts Group (JPEG) or Moving Pictures Expert Group (MPEG) compression techniques.

14. (Original) The method of claim 1, wherein the steps of providing the at least one transformed matrix, receiving the input data stream, and applying the at least one transformed matrix are performed by a printer.

15. (Currently Amended) The method of claim 1, further comprising:

decoding the output encoded image data; and

rendering the decoded image data on an output device.

16. (Original) The method of claim 15, wherein the output devices is a member of a set of output devices comprising a printer, display monitor, and storage.

17. (Currently Amended) The method of claim 1, wherein the fractional shift matrix is modified to accomplish dequantization and requantization of the transformed image data without inverse transforming the transformed image data.

18. (Currently Amended) A system for performing a fractional shift of transformed image data in communication with an output device, comprising:

a non-volatile storage;

three fractional shift transform matrices represented in the non-volatile storage that [[is]] are capable of fractionally shifting image data by a shift factor;

means for receiving the transformed image data;

means for applying the three fractional shift transform matrices $\tilde{A}$, $\tilde{B}$, and $\tilde{C}$ to vectors $\tilde{G}_1, \tilde{G}_2,..., \tilde{G}_m$ of the transformed image data to generate output transformed image data for the output device that is fractionally shifted by the shift factor without inverse transforming the transformed image data, wherein the output transformed image data is generated using two functions comprising:

$$\tilde{H}_k = \tilde{A} \bullet \tilde{G}_k + \tilde{B} \bullet \tilde{G}_{k+1} \quad \text{for } k = 1, 2, ..., m\text{-}1$$

$$\tilde{H}_k = \tilde{C} \bullet \tilde{G}_k \quad \text{for } k = m,$$

wherein the output transformed image data comprises an *mxm* matrix of the vectors $\tilde{H}_1$, $\tilde{H}_2,....,\tilde{H}_m$.

19. (Canceled)

20. (Currently Amended) The system of claim 18, wherein the transformed image data includes image data that has been downsampled.

21. (Original) The system of claim 18, wherein the shift factor is between zero and one.

22. (Original) The system of claim 18, wherein the non-volatile storage includes matrices having different shift factors to perform the fractional pel shift at different shift factors.

23. (Currently Amended) The system of claim 18, wherein the transformed image data is transformed by applying a Forward Discrete Cosine Transform (FDCT) to an input data stream.

24. (Original) The system of claim 23, wherein the input data stream was encoded performing entropy encoding after applying the FDCT and quantization.

25. (Currently Amended) The system of claim 24, further comprising:

means for entropy decoding the received encoded image data before applying the at least one fractional shift transform matrix; and

means for entropy encoding the output fractionally shifted transformed image data wherein the transformed image data to which the three transformed matrices are applied comprises the entropy decoded encoded image data[[.]].

26. (Original) The system of claim 18, wherein each fractional shift transform matrix is generated by applying a two-dimensional Forward Discrete Cosine Transform (FDCT) to a fractional shift matrix including the shift factors.

27. (Original) The system of claim 18, wherein the steps of providing the at least one transformed matrix, receiving the input data stream, and applying the at least one transformed matrix are performed by a printer.

28. (Currently Amended) The system of claim 18, further comprising:

decoding the output encoded image data; and

rendering the decoded image data on an output device.

29. (Original) The system of claim 28, wherein the output devices is a member of a set of output devices comprising a printer, display monitor, and storage.

30. (Currently Amended) The system of claim 18, wherein the fractional shift matrix is modified to accomplish dequantization and requantization of the transformed image data without inverse transforming the transformed image data.

31. (Currently Amended) An article of manufacture including code for performing a fractional shift of transformed image data, wherein the code causes communication with an output device and non-volatile storage and operations to be performed, the operations comprising:

providing three fractional shift transform matrices $\tilde{A}$, $\tilde{B}$, and $\tilde{C}$ in non-volatile storage that [[is]] are capable of fractionally shifting image data by a shift factor;

receiving the transformed image data; [[and]]

applying the fractional shift transform matrix to the transformed image data to generate output transformed image data that is fractionally shifted by the shift factor without inverse transforming the transformed image data[[.]]; and

means for applying the three fractional shift transform matrices $\tilde{A}$, $\tilde{B}$, and $\tilde{C}$ to vectors $\tilde{G}_1, \tilde{G}_2,..., \tilde{G}_m$ of the transformed image data to generate output transformed image data for the output device that is fractionally shifted by the shift factor without inverse transforming the transformed image data, wherein the output transformed image data is generated using two functions comprising:

$$\tilde{H}_k = \tilde{A} \bullet \tilde{G}_k + \tilde{B} \bullet \tilde{G}_{k+1} \quad \text{for } k = 1, 2, ..., m\text{-}1$$

$$\tilde{H}_k = \tilde{C} \bullet \tilde{G}_k \quad \text{for } k = m,$$

wherein the output transformed image data comprises an *m*x*m* matrix of the vectors $\tilde{H}_1$, $\tilde{H}_2,....,\tilde{H}_m$.

32. (Canceled)

33. (Currently Amended) The article of manufacture of claim 31, wherein the transformed image data includes image data that has been downsampled.

34. (Original) The article of manufacture of claim 31, wherein the shift factor is between zero and one.

35. (Original) The article of manufacture of claim 31, wherein the non-volatile storage includes matrices having different shift factors to perform the fractional pel shift at different shift factors.

36. (Currently Amended) The article of manufacture of claim 31, wherein the transformed image data is transformed by applying a Forward Discrete Cosine Transform (FDCT) to an input data stream.

37. (Original) The article of manufacture of claim 36, wherein the input data stream was encoded performing entropy encoding after applying the FDCT and quantization.

38. (Currently Amended) The article of manufacture of claim 37, further comprising:

entropy decoding the received encoded image data before applying the at least one fractional shift transform matrix; and

entropy encoding the output fractionally shifted transformed image data, wherein the transformed image data to which the three transformed matrices are applied comprises the entropy decoded encoded image data[[.]].

39. (Canceled)

40. (Currently Amended) The article of manufacture of claim 38, wherein the fractional shift is collocated on a first data point in the encoded image data to fractionally shift the image data.

41. (Previously Presented) The article of manufacture of claim 31, wherein the transform matrices $\tilde{A}$, $\tilde{B}$, and $\tilde{C}$ are modified to accomplish dequantization and requantization of the vectors $\tilde{G}_1, \tilde{G}_2,..., \tilde{G}_m$ and $\tilde{H}_1, \tilde{H}_2,....,\tilde{H}_m$, respectively.

42. (Original) The article of manufacture of claim 31, wherein each fractional shift transform matrix is generated by applying a two-dimensional Forward Discrete Cosine Transform (FDCT) to a fractional shift matrix including the shift factors.

43. (Currently Amended) The article of manufacture of claim 31, wherein the received and output encoded image data is encoded using one of the Joint Photographic Experts Group (JPEG) or Moving Pictures Expert Group (MPEG) compression techniques.

44. (Original) The article of manufacture of claim 31, wherein the steps of providing the at least one transformed matrix, receiving the input data stream, and applying the at least one transformed matrix are performed by a printer.

45. (Currently Amended) The article of manufacture of claim 31, further comprising:
decoding the output encoded image data; and
rendering the decoded image data on an output device.

46. (Original) The article of manufacture of claim 45, wherein the output devices is a member of a set of output devices comprising a printer, display monitor, and storage.

47. (Currently Amended) The article of manufacture of claim 31, wherein the fractional shift matrix is modified to accomplish dequantization and requantization of the transformed image data without inverse transforming the transformed image data.